

IN THE CLAIMS:

Kindly replace the claims of record with the following full set of claims:

1. (Currently amended) A master substrate comprising a substrate layer (10) and a recording stack deposited on the substrate layer, the recording stack comprising:

a mask layer (12); and
an interface layer (11) sandwiched between said mask layer and the substrate, said mask layer comprising:
a recording material, in an initially crystalline state, for forming amorphous marks and spaces representing an encoded data pattern, said amorphous marks being formed ~~forming of marks by~~:
thermal decomposition by a focused laser beam ~~and~~
wherein said marks have ~~having~~ a different phase than the unrecorded material,
rinsing the master substrate layer a first time with a developer, being one of an alkaline or an acid liquid, and
at least one of the interface layer and the substrate layer etched corresponding to the spaces in the mask layer, wherein the at least one of the interface layer and the substrate layer, in an initially amorphous state, being etched using a process different than that used to etch the encoded data pattern into the mask layer, wherein the marks in the at least one of the interface layer and the substrate layer are recorded as crystalline marks.

2. (original) A master substrate as claimed in claim 1, wherein said recording material is a growth-dominated phase-change material, said material is an alloy comprising at least two materials of the group of materials containing Ge, Sb, Te, In, Se, Bi, Ag, Ga, Sn, Pb, As.

3. (original) A master substrate as claimed in claim 1, wherein said recording material is a Sb-Te alloy material, in particular Sb₂Te doped with Ge and In.

4. (original) A master substrate as claimed in claim 1, wherein said recording material is a Sn-Ge-Sb-alloy material, in particular with the composition $\text{Sn}_{18.3} - \text{Ge}_{12.6} - \text{Sb}_{69.2}$.
5. (original) A master substrate as claimed in claim 1, wherein said mask layer (12) has a thickness in the range from 2 nm to 50 nm, preferably between 5 and 40 nm.
6. (Currently amended) A master substrate as claimed in claim 1, wherein said interface layer (11) is made of a material selected from of the group of dielectric materials containing ZnS-SiO_2 , Al_2O_3 , SiO_2 , Si_3N_4 .
7. (original) A master substrate as claimed in claim 1, wherein said interface layer (11) comprises at least one organic dye selected from the group phthalocyanine, cyanine and AZO dyes.
8. (original) A master substrate as claimed in claim 1, wherein said interface layer (11) comprises an organic photoresist selected from the group Diazonaphthoquinone-based resists.
9. (original) A master substrate as claimed in claim 1, wherein said interface layer (11) has a thickness in the range from 5 nm to 200 nm, in particular between 20 and 110 nm.
10. (original) A master substrate as claimed in claim 1, wherein the recording stack further comprises a protection layer (81) adjacent the mask layer (12) at a side most remote from the substrate.

11. (original) A master substrate as claimed in claim 10, wherein said protection layer (81) has a thickness between 2 and 50 nm, in particular between 5 and 30 nm.

12. (Currently amended) A master substrate as claimed in claim 10, wherein said protection layer (81) is selected from a ~~made of the~~ group of dielectric materials containing ZnS-SiO₂, Al₂O₃, SiO₂, Si₃N₄, Ta₂O.

13. (original) A master substrate as claimed in claim 10, wherein said protection layer (81) comprises an organic material, in particular selected from the group Diazonaphthoquinone-based photoresists, or from the group soluble organic materials, like PMMA.

14. (Previously presented) A master substrate as claimed in claim 1, wherein the recording stack further comprises a second interface layer (82) between said substrate layer and said interface layer (11).

15. (original) A master substrate as claimed in claim 14, wherein said second interface layer (82) has a thickness between 10 and 100 nm, preferably between 15 and 50 nm.

16. (Previously presented) A master substrate as claimed in claim 1, wherein a metal heat sink layer (83) is present between said substrate layer and said interface layer (11) or (82).

17. (original) A master substrate as claimed in claim 16, wherein said metal heat sink layer (83) has a thickness larger than 5 nm, in particular larger than 15 nm.

18. (original) A master substrate as claimed in claim 16, wherein said metal heat sink layers (83) comprises a material selected from the group of materials Al, Ag, Cu, Ag, Ir, Mo, Rh, Pt, Ni, Os, W and alloys thereof.

19. (Currently amended) A method of manufacturing a stamper for replicating a high density relief structure comprising at least the steps of

illuminating a master substrate comprising a mask layer, in an initially crystalline state, an interface layer and a substrate layer a first time with a modulated focused radiation beam forming marks and spaces representative of an encoded data pattern therein,

rinsing the illuminated master substrate layer a first time with a developer, being one of an alkaline or an acid liquid, preferably selected from the ~~of the~~ group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that a desired first relief structure results,

illuminating the interface layer of the master substrate ~~for a second time~~ through the first relief structure, serving as a mask, using an illumination source different than that used in illuminating the master substrate, said interface layer being in an initially amorphous state;

rinsing the illuminated master substrate layer a second time with a developer, being one of an alkaline or an acid liquid, preferably selected from ~~of~~ the group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that the first relief structure is deepened to form a second relief structure;

sputter-deposition of a metallic layer, in particular a Nickel layer,
galvanically growing the sputter-deposited layer to the desired thickness
forming the stamper,

separating the master substrate from the stamper.

20. (Cancelled)

21. (Previously presented) A method as claimed in claim 19 wherein the marks are formed by thermal decomposition by a focused laser beam and said marks having a different phase than the unrecorded material, the mask layer (12) having a thickness in the range 5-35 nm wherein a pre-grooved shaped first relief structure is formed for replication of write-once and rewritable optical discs.

22. (Previously presented) A method as claimed in claim 19 wherein the second relief structure is formed in both the mask layer (12) and the interface layer (11).

23. (Previously presented) A method as claimed in claim 19 wherein the second relief structure is further deepened, by etching, to form a third relief structure such that the third relief structure is contained in the mask layer (12), the interface layer (11) and partly in the substrate (10).

24. (Previously presented) A method as claimed in claim 19, in which the developer solution is used in a concentration 1-30%, preferably between 2 and 20%.

25. (Currently amended) A pre-recorded optical disc replicated with a stamper manufactured by_

illuminating a master substrate comprising a mask layer, initially in a crystalline state, an interface layer and a substrate layer a first time with a modulated focused radiation beam forming marks and spaces representative of an encoded data pattern therein,

rinsing the illuminated master substrate layer a first time with a developer, being one of an alkaline or an acid liquid, preferably selected from of the group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that a desired first relief structure results,

illuminating the interface layer of the master substrate ~~for a second time~~ through the first relief structure, serving as a mask, using an illumination source different than that used in illuminating the master substrate, said interface layer being in an initially amorphous state;

rinsing the illuminated master substrate layer a second time with a developer, being one of an alkaline or an acid liquid, preferably selected from of the group of solutions of NaOH, KOH, HCl and HNO₃ in water, such that the first relief structure is deepened to form a second relief structure;

sputter-deposition of a metallic layer, in particular a Nickel layer,
galvanically growing the sputter-deposited layer to the desired thickness
forming the stamper separating the master substrate from the stamper,
characterized in that the relief structure on the stamper surface comprises
shortest pits having a typical crescent and longer pits having a swallow-shaped
trailing edge and that the relief structure is replicated in the optical disc.